REMARKS/ARGUMENTS

Claims 1, 5-10, 14-24, and 26-28 are currently pending.

Claims 1, 5-10, 14-24, and 26-28 stand rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,965,942 (Young et al.) in view of U.S. Patent No. 6,697,382 (Eatherton).

Claim 1 is directed to a method for operating a point-to-multipoint wireless communication network. The method includes measuring link delays between a root bridge and a plurality of non-root bridges, calculating a common time slot value based on the measured link delays, distributing the measured link delays and the common time slot value within the point-to-multipoint wireless communication network, and aligning contention timing boundaries based on the measured link delays and the common time slot values. The contention timing boundaries coordinates transmissions and reduces the probability of collision in a carrier-sense multiple access with collision avoidance scheme. The common time slot value is calculated based on a longest measured link delay and that that aligning contention timing boundaries includes adjusting a network allocation vector.

Young et al. describe a system for improving throughput over WLANs with mode switching. The system sets a contention window value that is lower than that set by the IEEE 802.11 standard. Factors considered in determining the load and establishing the contention window include number of transmissions, number of receptions, and number of collisions.

Young et al. do not use link delays or any type of measurement to coordinate transmissions. Young et al. use load conditions to establish a contention window, which is used to determine a backoff period (delay). Young et al. improve throughput by reducing the contention window, and thus the delay. As described at col. 6, lines 50 - col. 7, line 4 of Young et al., systems operating in accordance with IEEE 802.11 select a random delay from a contention window that begins with an initial value or number of slots. For each subsequent collision event, the contention window size is approximately doubled. Young

et al. set a minimum value for the initial contention window that is lower than used in the 802.11 standard, and each subsequent window increases at a slower exponential rate than the standard systems. Thus, it is only the size of the contention window that is adjusted in Young et al.

In contrast to Young et al., applicants' invention uses a measurement to coordinate transmissions by aligning contention timing boundaries including a time slot value and network allocation vector. As set forth in 802.11, a network allocation vector (NAV) timer is set after transmittal of the RTS and CTS frames. The NAV timer counts down from its initialization value to zero. After expiration of this time, there is a backoff time before a node can transmit. The backoff time is computed as the product of a locally computed random number and a system time slot. The random number generation is distributed between 0 and a contention window value. It is this contention window value that Young et al. reduce to increase system throughput. Young et al. do not discuss modifying the system time slot value or the network allocation vector.

Moreover, the coordinated transmissions between the root bridge and plurality of non-root bridges in the claimed invention reduce the probability of collisions. The measured link delays are used to align contention time boundaries and modify system time slot to reduce packet collision probability and therefore improve overall system throughput. Applicants' invention improves throughput by coordinating transmissions based on the measured link delay, whereas Young et al. improve throughput by reducing delay. The reduction in contention window in Young et al. clearly increases the probability of collision. Young et al. specifically monitor the number of collisions for situations where the number of collisions is increased due to the reduction in window size.

Conventional CSMA/CA operation as disclosed in Young et al. provides no shared understanding of system timing, thus, there is a much higher probability of collisions due to breakdown of the MAC layer collision avoidance mechanism. For example, when a new packet RTS or CTS is heard, the NAV time is set based on this duration field. Until this timer expires, the medium is considered to be busy. Expiration of a prospective transmitter's NAV timer may not be a realistic indication of medium availability from the

perspective of the intended receiver. At the conclusion of the busy period, a transmitter that begins a transmission right at the beginning of a slot may potentially collide with other transmitters that are beginning transmission on that slot or some portion of the previous slot due to the varying understanding of the slot boundaries and delayed detection of simultaneous transmissions due to link propagation delays. As link distances increase, packet collision probabilities will also increase unless timing boundaries are well understood at all stations.

Furthermore, conventional physical layer carrier sense mechanisms may not be helpful in a wireless campus network due to a hidden terminal problem. Thus, much larger collision probabilities can be expected when conventional 802.11 techniques are extended to campus-scale wireless networks. The claimed invention adapts 802.11 techniques to networks with larger propagation delays, such as campus point-to multipoint wireless networks. Applicants' invention is particularly advantageous in that aligning contention timing boundaries and modifying the system time slot based on measured link delays is very effective in reducing packet collision probability.

Without the modifications provided by the claimed invention, it can be seen that throughput is severely impacted by collisions in IEEE 802.11 point-to-multipoint wireless bridge systems (see, e.g., pages 18-21 and related Figures in the specification). Aligning contention timing boundaries and modifying system slot time based on measured link delays is very effective in reducing packet collision probability and thus improving overall system throughput.

As noted by the Examiner, Young et al. do not teach link delays or a common time slot. The Examiner cites Eatherton with respect to these limitations.

The Eatherton patent issued February 24, 2004 and is assigned to Cisco Technology, Inc., which is the same assignee as the subject patent application. The American Inventors Protection Act (AIPA) amended 35 U.S.C. § 103(c) to exclude subject matter developed by another person which qualifies as prior art under Section 102(e), provided that this subject matter and the claimed invention were commonly owned at the time the claimed invention was made. This amendment to Section 103(c) applies to patent

applications filed on or after November 29, 1999. (American Inventors Protection Act of 1999, Pub. L. No. 106-113, Sec. 4807(b)). The subject patent application was filed after November 29, 1999 and the invention was commonly owned with the subject matter of the Eatherton patent at the time the invention was made. Therefore, the Eatherton patent should be removed as a reference against the claimed invention.

Accordingly, claims 1, 5-10, 14-24, and 26-28 are submitted as patentable over the cited references.

For the foregoing reasons, Applicants believe that all of the pending claims are in condition for allowance and should be passed to issue. If the Examiner feels that a telephone conference would in any way expedite prosecution of the application, please do not hesitate to call the undersigned at (408) 399-5608.

Respectfully submitted,

Cindy S. Kaplan
Reg. No. 40,043

P.O. Box 2448
Saratoga, CA 95070
Tel: 408-399-5608
Fax: 408-399-5609